Form 9-014

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.
Helena, Montana

SMALL AREA HIGHWAY PROGRAM

Progress Report to the Montana Highway Department
for
Season Ending September 30, 1957

3rd. Report

Sept. 30, 1956 — Sept. 30, 1957

U. S. GEOLOGICAL SURVEY
408 FEDERAL BUILDING
HELENA, MONTANA
MARCH 1, 1958

For Administrative Use Only

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SMALL AREA HIGHWAY PROGRAM

Progress Report to the Montana Highway Department
for
Season Ending September 30, 1957

Introduction

This third interim report has been prepared at the request of the Montana Highway Commission under the provisions of annual cooperative agreements. It covers the water year, October 1, 1956 to September 30, 1957.

In addition to annual reports, Mr. L. W. Hargrove, hydrologist, Montana Highway Department, has received information on outstanding floods and other flow data as requested.

Data collection continued to be the principal phase of the program during this third year of the six-year program. Forty partial-record sites were operated in eastern Montana for records of peak flow. The results of the past season are included in this report.

A provisional study "Floods in Eastern Montana" furnished December 2, 1957, presented data on the magnitude and frequency of floods based on the discharge records collected at sixteen long-term gaging stations. It points up the desirability of an expansion of data collection.

Purpose of the Program

The purpose of the six-year program initiated in 1955, is to

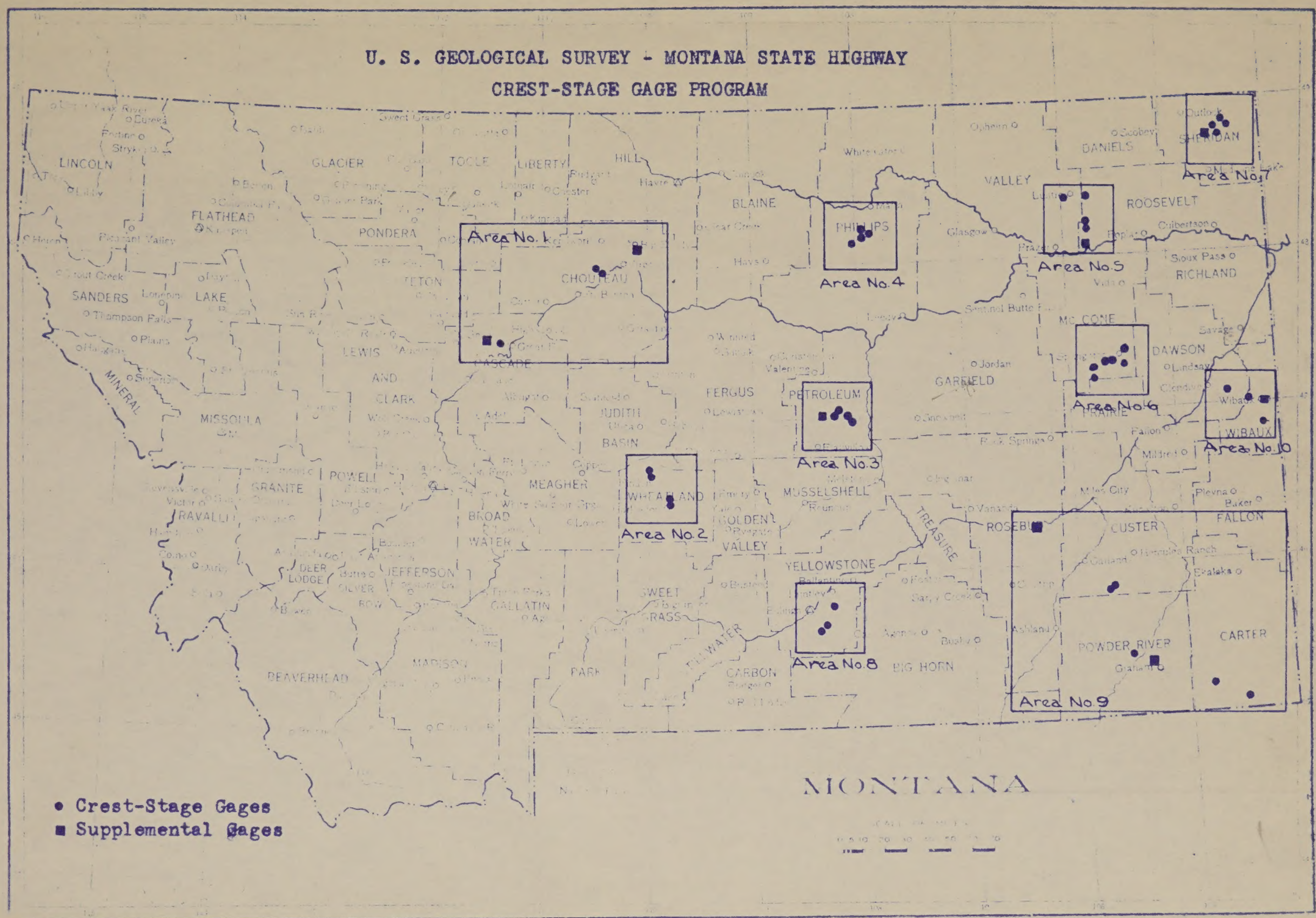

Figure 1 - Map Showing Location of Crest-stage and Supplemental Gage Sites

present the data as a magnitude and frequency study of peak flows from small areas. A provisional study of sixteen long-term stations for computing the magnitude and frequency of peak flows for any basin within the limits expressed was furnished December 2, 1957. This provisional report was provided as an example of the type of analysis which may be expected from the program after sufficient data has been collected. It may also have some interim value for the determination of probable peak flows from larger streams.

A study is being initiated to incorporate the apparently significant data collected at the crest-stage sites since July 1, 1955. It is possible that some useable information can be obtained from the crest-stage gages and which will supplement the magnitude and frequency study of the sixteen long-term stations. The satisfactory addition of the data from the crest-stage gages would allow the determination of peak flows for a selected frequency on smaller drainage areas. It must be remembered that the six-year program undertaken with your agency was regarded as a bare minimum from the point of time span and number of partial record gages. Further data would undoubtedly improve the quality and reliability of any frequency study.

Station Network

The station network consists of 10 principal areas with 40 partial-record sites and 8 supplemental long-term stations shown in figure 1. The original network consisted of 39 partial-record sites and 8

supplemental stations. Two stations were discontinued during the 1956 season, Chouteau No. 3 near Virgelle and Dry Ash Creek near Circle. During the 1957 season, three partial-record sites were established in Area No. 6 - Circle, Tusler Creek near Brockway, McCone No. 1 near Brockway, and Duck Creek near Brockway. Of the original 8 supplemental stations, two stations have been re-established as complete-record sites, namely, Wolf Creek near Wolf Point and Little Powder River near Broadus.

Progress During Season

Since September 30, 1956, there have been 224 observations of flow recorded at the 40 partial-record sites. During the season, 24 current-meter measurements were made and 4 indirect measurements of peak flow obtained. The measurements were used in rating 6 additional stations, making a total of 19 rated stations. A tabulation of the peak flows that occurred at the rated stations is shown on page 8. One copy of Appendix A, which lists the observations of discharge at the individual stations, has been furnished to your hydrologist. A brief summary of appendix A is shown below.

Summary of Progress and Observations of Peak Flow

Area No. 1 - Great Falls.--Three crest-stage gages in operation besides two supplemental regular gaging stations. No ratings developed due to lack of significant flows.

Number of high-water marks found at the three crest-stage gages -	11

Number of times visited when no high-water marks were found - 13

Area No. 1 - Barlowton.--Four crest-stage gages in operation. Two gages were not rated due to lack of significant flow. Two gages have been rated previously on the basis of prior determinations of discharge.

Number of high-water marks found at rated gages - - - - - - 6

Number of high-water marks found at non-rated gages - - - 5

Number of times visited when no high-water marks were found - 30

Area No. 2 - Wingatt.--Four crest-stage gages in operation besides one supplemental gaging station. Three crest-stage gages have been rated. One gage was not rated due to lack of significant flow.

Number of high-water marks found at rated gages - - - - - - 11

Number of high-water marks found at non-rated gages - - - 6

Number of times visited when no high-water marks were found - 24

Area No. 3 - Valley.--Four crest-stage gages in operation. Three gages not rated due to lack of significant flow.

Number of high-water marks found at rated gages - - - - - - 3

Number of high-water marks found at non-rated gages - - - 24

Number of times visited when no marks were found - - - - - 19

Area No. 4 - Wolf Point.--Four crest-stage gages in operation, and one complete record site. No stations were rated due to lack of significant flow.

Number of high-water marks found at non-rated gages - - - 34

Number of times visited when no marks were found - - - - 30

Area No. 6 - Circle.—Six crest-stage gages in operation, of which three were newly established stations. Dank Creek near Brockway, Fuller Creek near Brockway and McCone No. 1 near Brockway. Two gages have been previously rated. The new station, Dank Creek experienced a flood and the peak discharge was determined by the slope-area method.

Number of high water marks found at rated gages - - - - - 14

Number of high water marks found at non-rated gages - - - 20

Number of times visited when no marks were found - - - - 36

Area No. 7 - Plentywood.—Four crest-stage gages and one supplementary station were in operation. Two gages experienced significant flow which was determined by flow through culvert methods.

Number of high-water marks found at rated gages - - - - - 6

Number of high-water marks found at non-rated gages - - - 20

Number of times visited when no marks were found - - - - 43

Area No. 8 - Billings.—Three crest-stage gages were in operation. With seven current meter measurements on two of these crest-stage gages, provisional ratings were developed. The third gage was previously rated.

Number of high-water marks found at rated gages - - - - - - 31

Number of times visited when no marks were found - - - - 1

Area No. 9 - Broadus.—Five crest-stage gages were in operation, of

which one is a water-stage recorder installation. In addition there are two supplemental stations. Two gages are not rated due to lack of significant flow.

Number of high-water marks found at rated gages - - - - - -	20
Number of high-water marks found at non-rated gages - - -	7
Number of times visited when no marks were found - - - -	13

Area No. 10 - Albany.—Three crest-stage gages were in operation and one supplemental station. No ratings were developed due to lack of significant flow.

Number of high-water marks found at non-rated - - - - - - -	13
Number of times visited when no marks were found - - - -	17

Summary of Field Work:

Inspections of crest-stages - - - - - - - - - - - - - -	400
High-water marks found at time of inspections - -	224
Discharge measurements: Current-meter - - - - -	25
Indirect - - - - - - - -	4
Estimates of flow - - - - - - - - - - - - - - - - - -	26

Peak Flows at Gated Crest-stage Gages
during Season October 1, 1956 to Sept. 30, 1957

Area No.	Station	Drainage Area Sq. Mi.	Probable date of Peak	Discharge cfs
2	Wheatland No.2 near Harlowton	3	6-16-57	300
2	Antelope Cr at Harlowton	73	6-16-57	380
3	Petroleum No.2 near Winnett	2.38	6-30-57	60
3	Petroleum No.3 near Winnett	0.81	6-30-57	55
6	East Fork Duck Creek near Brockway	12.4	7-14-57	365
6	McCune Creek near Circle	28	7-14-57	275
6	South Fork Dry Ash near Circle	5.74	2-27-57	52
6	Duck Creek near Brockway	52	7-14-57	561
7	Box Elder Creek near Plentywood	12.6	7-23-57	164
7	Box Elder Creek at danelte, near Plentywood	23.1	7-23-57	1600
7	Spring Creek near Plentywood	7.05	7-23-57	76
7	Spring Creek at Highway 16, near Plentywood	16.9	7-23-57	341
8	Weta Creek near Billings	9.14	6-10-57	62
8	Yellowstone No. 1 near Billings	2.58	5-21-57	96
9	Basin Creek near Volborg	9	4-23-57	300
9	North Creek near Alzada	0.73	8-28-57	166
9	Wolf Creek near Harmond	9.65	6-28-57	68

Park Plans at Grand Canyon-Kaibab Square
During Season Opening L, 1959 to Sept. 30, 1959

Item No.	Station	Drainage Area sq. mi.	Probable Data Date	Discharge cfs
1	Bright Angel Creek near Bucklaroo	1	8-24-57	300
2	Bottom Dr at Bucklaroo	70	8-24-57	300
3	Petroglyph Creek near Grandview	0.21	8-30-57	8
3	Petroglyph Creek near Grandview	0.22	8-30-57	23
4	Bonita Creek Below Grand Canyon Village	21.4	7-24-57	340
5	Bonita Creek near Grandview	4	7-24-57	475
6	Bonita Creek Trap Dam near Grandview	3.5	8-27-57	20
6	Bonita Creek near Grandview	20	7-24-57	185
7	Bonita Creek near Grandview	23.4	7-24-57	3.5
7	Bonita Creek at Grandview near Flagstaff	23.4	7-24-57	1400
7	Bonita Creek near Flagstaff	7.25	7-24-57	35
7	Bonita Creek at Highway 66 near Flagstaff	3.7	7-24-57	24
8	Bonita Creek near Williams	3.41	7-24-57	42
8	Williamson Wash 1 near Williams	1.52	7-24-57	37
9	Bonita Creek near Valdora	5	6-25-57	200
9	Bonita Creek near Ashfork	5.5	7-25-57	140
9	Alta Creek near Ashfork	9.17	7-25-57	--

Plans for 1958 Season

Data collection at the forty partial-record sites will continue to be the principal activity of this program. In the Circle area it has been found desirable to expand the coverage, and it is planned to install two additional crest-stage gages in that area. The probable need for more partial-record sites on small areas and supplemental gaging stations is evident. Four new gaging stations on intermittent streams were established in eastern Montana under another program. They should prove useful to your program, particularly if one or more crest-stage gages may be operated in conjunction with each gaging station. We will endeavor to make these additional crest-stage gage installations under another program during the spring months. Their continued support under the highway program seems appropriate in subsequent fiscal years.

Analysis of data as it becomes available will continue with the object of providing your agency with some interim information on the magnitude and frequency of peak flows and to test methods. Such studies will also point up weaknesses in data which may still be corrected during the initial six-year period.

Your attention is invited to the desirability of a state-wide report on the magnitude and frequency of peak flows based upon all gaging station records. A summary compilation of records due for completion in June 1958 would readily supply the base data. You may

recall that consideration of a flood frequency report was postponed until the compilation report would be available.

MONTANA DISTRICT

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Importance of: Big Sandy Creek near Assinniboine, Mont. 1-Supplemental

No.	Date of Gage	Number of Days of Peak	Gage Height	Discharge in cfs	Method of Rating	Remarks
Assiniboine station operated February 1944 to November 1951; measurements nos. 1-67.						
	1956					
68	Apr. 11		6.97	546	Slope-area	Started rainfall. Control shifts about
69	12		4.24			
	1956					
	Apr. 7		4.63			Complete ice cover. Shallow-weight gage, not in temporary
	26		6.26			
	Apr. 28		2.05			Puddles on control
	29		1.85			
	May 25		2.72	5	Extreme	Bowlder on control
70	28		2.68	4.8	Slope-area	
	June 5		.98	0		
	1957					
71	Mar. 2		1.18	[illegible]	Slope-area	2" ice in low water
72a	18		1.04	50	Backwater	Ice gone low
73	26		3.11	38.2	Slope-area with backwater	Control clear
74	27		3.42	[illegible]	do.	do
75	Mar. 28		2.30	1.6	do.	
	July 25			0		Gage post overturned by
	Aug. 30		.80	0		do

Appendix A

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Big Sandy Creek near Assinniboine, Mont. 1-Supplemental

No.	Date of Insp.	Probable Date of Peak	Cork Line Gage Height	Discharge in cfs	Method of Determining Discharge	Remarks
Recording station operated February 1946 to November 1953; measurements nos. 1-67.						
68	1955 Apr. 11		6.07	546	Disch. mmt.	Started recorder Control appears clear
69	14		4.54	236	do	
	1956 Mar. 7		4.63			Complete ice cover
	30		6.26			Counter-weight gone, put on temporary
	Apr. 12		2.25			Rubbish on control
	18		3.06			
	May 25		2.72	5	Estimate	Rubbish on control
70	29		2.68	4.9	Disch. mmt.	do
	Oct. 3		.98	0		
71	1957 Mar. 2		4.48	62.3	Disch. mmt.	½" solid ice cover
72e	18		4.06	50	Estimate	Flow over ice
73	26		3.11	56.2	Discharge mmt.	Control clear
74	29		2.82	24.1	do	do
75	May 18		2.30	1.6	do	
	July 25			0		Gage pool nearly dry
	Aug. 20		.88	0		do

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at CASCADE NO. 1 NEAR GREAT FALLS, MONT. 1-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 AUG. 16	GAGE INSTALLED				~~DC 117.63~~
1	1956 MAR. 29		1.20			NO FLOW TODAY
2	MAY 24		–	0		DO
3	JUNE 21		–	0		RAINING
4	JULY 24		–	0		
5	AUG. 22		–	0		
6	SEPT. 19		–	0		HAND LEVELS –.05 CORR.
7	20		–	0		
8	OCT. 4		–	0		
9	1957 MAR. 28		1.00			GAGE HEIGHT FROM SNOW-MELT POOLED AT GAGE. NO FLOW TODAY
10	MAY 21			0		
11	SEPT. 30		1.08			NO FLOW TODAY INST. LEVELS –.035

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at CHOTEAU NO. 1 NEAR LOMA, MONT. 1-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 AUG. 18	GAGE INSTALLED				~~DC + 18.08~~
1	NOV. 7		—			
2	1956 APR. 16		.08			
			—	0		CULVERT ½ FULL SNOW
3	MAY 29		—			NO MARKS
4	JUNE 21		—			GENERAL RAIN
5	JULY 26		—	0		
6	AUG. 24		—	0		
7	SEPT. 19		—	0		HAND LEVELS - + .005
8	OCT. 3		—	0		
9 a	1957 MAR. 2		1.74			
b			.73			TRICKLE TODAY
10	MAR. 25		0			
11	MAY 25		0			
12	JULY 4		0			
13	AUG. 9		0			
14	29		—			
15	SEPT. 30		—			INST LEVELS .00
16	OCT. 30		—			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at CHOTEAU NO. 2 NEAR LOMA, MONT. 1-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 AUG 18	GAGE INSTALLED				~~D.G. = 15.87~~
1	NOV. 7		–			
2	1956 APR. 16		–	0		
3a	MAY 29		2.97			
b			1.29			FLAGGED HIGHWATER MARK NOTHING TODAY
4	JUNE 21		.95			WATER STANDING AT GAGE. NOTHING TODAY
5	JULY 26		–	0		
6	AUG. 24		–	0		
7	SEPT. 19		1.18			LEVELS -.03 (HAND) NOTHING TODAY
8	OCT. 3		.60			NOTHING TODAY
9a	1957 MAR. 2		2.46			
b			1.42			
c			1.17			
d			.98	TRICKLE		3' SNOW AROUND GAGE SOME ICE IN CULVERT
10	MAR. 25		1.2			PROBABLE FLOW VERY SMALL. SPREADER DITCH UPSTREAM NOTHING TODAY
11	MAY 25		0			
12a	JULY 4		.68			
b			.64			FLOW PROBABLY JUST A TRICKLE. NOTHING TODAY
13	AUG. 9		0			
14	29		0			
15	SEPT. 30		0			INST. LEVELS +0.015
16	OCT. 30		0			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at WHEATLAND NO 1 NEAR HARLOWTON, MONT. 2-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 13	GAGE INSTALLED				~~DC + 1971~~
1	28		—			
2	AUG 29		—	0		
3	SEPT. 8		—	0		
4	29		—	0		
5	NOV. 1		—			
6	1956 APR 6		—	0		THAWED OUT PIPES. CHANNEL AND CULVERT FULL OF ICE AND SNOW. NO FLOW THIS YEAR.
7	JUNE 1		—	0		
8	26		1.38			NO FLOW TODAY
9	AUG. 2		—	0		
10	31		—	0		
11	SEPT. 10		—	0		HAND LEVELS -.02
12	OCT. 3		—	0		
13	30		—	0		
14a	1957 APR. 2		.58			
b			.30	0		ICE & SNOW ON CONTROL
15	MAY 1			0		
16	29			0		
17	JUNE 25		—	0		
18	JULY 23		—			
19	AUG. 27		—			
20	OCT. 1		—			
21	9		—			INST. LEVELS -.005
22	28		—			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at WHEATLAND NO. 2 NEAR HARLOWTON, MONT. 2-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 12	GAGE	INSTALLED			~~DC #16 96~~
1	28		–			
2	AUG. 29		–	0		
3	SEPT. 8		–	0		
4	29		–			
5	NOV. 1		–			
6	1956 APR. 6		1.60			
			–	0		NO VISIBLE HIGHWATER MARKS. CHANNEL FULL OF SNOW. REST OF COUNTRY DRY
7	JUNE 1		–	0		
8	26	JUNE 14, 1956	.92	87.5	SLOPE-CONVEYANCE	NO FLOW TODAY
9	AUG. 2		.05	//		PROBABLY GROUNDWATER
10	31		–	0		
11	SEPT. 10		–	0		LEVELS NO D.C.
12	OCT. 3		–	0		
13	30		–	0		
14	1957 APR. 2		1.15			BACKED UP BY ICE AND SNOW. NOTHING TODAY
15	MAY 1		0			
16	29		0			
17	JUNE 25		1.57			
18	JULY 23		–			
19	AUG. 27		–			
20	OCT. 1		–			
21	9		–			INST. LEVELS –.06
22	28		–			

HELENA DISTRICT

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at WHEATLAND NO. 3 NEAR HARLOWTON, MONT 2-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 13	GAGE INSTALLED				~~D.C. +18.10~~
1	28		–			
2	AUG 29		–			
3	SEPT. 8		–			
4	29		–			
5	NOV. 2		–			
6	1956 MAR. 30		0.78			
			.56			
			–	1	ESTIMATE	CHANNEL CLEAR. RANCHER SAYS NOTHING MUCH THIS YEAR – RUNOFF MUST HAVE OCCURED LAST FALL.
7	JUNE 1		–	0		
8	26		3.46			NO FLOW TODAY
9	AUG. 3		–	0		
10	31		–	0		
11	SEPT. 10		–	0		HAND LEVELS D.C. +.05
12	OCT. 3		–	0		
13	NOV. 1		–	0		
14	1957 APR. 3		0			
15	MAY 2		0			
16	27		0			
17a	JUNE 26		1.90			
b			1.44			NO FLOW TODAY
18	JULY 23		1.36			FLOW PROBABLY DUE DO TO IRRIGATION
19	AUG. 27		–			
20	OCT. 1		–			

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Wheatland No. 3 near Harlowton, Mont. 2-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
21	1957 Oct. 9		-			Inst. levels .045
22	29		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at ANTELOPE CREEK AT HARLOWTON, MONT. 2-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
1		JUNE 17, 1950	27.45	24,400	SLOPE-AREA & CONTRACTED OPEN.	
2		AUG. 15, 1954	15.22	1,600	CONTRACTED OPEN.	
3		JUNE 26, 1955	13.73	591		
4	1955 JUNE 26		13.53	552	FLOAT	
5	JULY 12		— .46	11.3		INSTALLED GAGE ~~DEC 1972~~
6	28		—			
7	AUG. 29		—			
8	SEPT. 8		—			
9	29		—			
10	NOV. 2		—			
11	1956 MAR. 30		.92	160		
			—	4	ESTIMATE	NO ICE ALL FLOW IS ON RIGHT SIDE AND MISSING GAGE.
12	JUNE 1		—	0		
13	26	[illegible]	3.28	800		NO FLOW TODAY
14	AUG. 3		—	0		
15	31		—	0		
16	SEPT. 10		—	0		HAND LEVELS +.025
17	OCT. 3		—	0		
18	NOV. 1		—	0		
19	1957 APR. 3		0			
20	MAY 2		0			
21	27		0			
22	JUNE 19		0			

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Antelope Creek at Harlowton, Mont. 2-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
23 a	1957 June 21		1.52			
b			.77			
c			.63			gage-height today not measured
24	June 26		.67			No flow today
25	July 23		.20			do
26	Aug. 27		--			do
27	Oct. 1		-			
28	9		-			Inst. levels -.005
29	29		-			

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at McDonald Creek at Winnett, Mont. 3-Supplemental

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
Manual station operated 1930-32, 1934-45 and February 1953 to September 1956; measurements no. 1-144 for all periods of record. Numbers shown here pertain only to crest-stage gage program.						
1	1956 Oct. 18	Cant. corr'd. .53	CSG 1.24	0	CMM No. 144	D.C. - .71 to cantilever +1.46 to CSG
2	1957 Feb. 28		frozen in			Complete ice cover, some water over ice
3 a	Mar. 27		.85			
b			below gage	.05	CMM No. 145B Estimate	Control clear; shore ice not touching water
4	Apr. 29		-.80	.04	CMM No. 146e Estimate	
5	May 30		-	0		Trickle
6	July 1		.55			CSG dry
7	25		-			
8	Aug. 30		-			
9	Sept. 26		-			
10	Oct. 8		-			inst. levels 1.46

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at PETROLEUM No. 1 NEAR WINNETT, MONT. 3-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 14	GAGE INSTALLED				~~DC 11798~~
1	SEPT 26		2.20	[illegible]		
			–	0		
2	OCT 25		–	0		
3	NOV. 25		–	0		
4	1956 MAR. 26		0.45	[illegible]		
			–	TRICKLE		
5	APR. 23		–	POOL		DOUBTFUL IF THERE WAS ANY APPRECIABLE FLOW FROM SNOW MELT.
6	MAY 25		–	0		
7a	JUNE 22	1956 JUNE 18 or 19	2.11	[illegible]		
b			1.52	78		NO FLOW TODAY
8	JULY 13		–	0		
9a	AUG. 16		1.03	46		
b			.43	[illegible]		NO FLOW TODAY
10a	SEPT. 10		1.91	108	SLOPE-CONVEYANCE	
b			1.55	[illegible]		NO FLOW TODAY
11	13		–	0		HAND LEVELS – .03
12	OCT. 18		–	0		
13a	1957 FEB. 28		.66			EVIDENCE OF JAMMING
b			– .20	3.5	ESTIMATE	
14	MAR. 27		BELOW GAGE	.2	DO	
15	APR. 29		–	0		
16	MAY 30		–	0		
17	JULY 1		–	0		

1M—4-56—2064

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Petroleum No. 1 near Winnett, Mont. 3-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
18	July 25		-			
19	Aug. 30		-			
20	Sept. 26		-			
21	Oct. 8		-			Inst. levels -.005

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at BOX ELDER CREEK NEAR WINNETT, MONT. 3-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 MAY 27	GAGE	INSTALLED			~~D.G. + 6.87~~
1	JUNE 21		1.75			
			1.55			AT INSPECTION
2	JULY 21		1.57			
			–			
3	AUG. 24		3.21			
			–	0		
4	SEPT. 26		1.90			
			1.14			
			–			
5	OCT. 25		–			
6	NOV. 25		–			
7a	1956 MAR. 26		2.65			
b			2.30	0.3	ESTIMATE	
8a	APR. 23		2.00			
b			1.65			
c			1.30	POOL		
9a	MAY 25		2.00			
b			1.36			
c			1.05	NO FLOW		
10 a	JUNE 22		2.07			
			2.03			POOL STAGE – PROBABLY NO FLOW OVER SAND BARS
11 a	JULY 13	1956	2.49			
b			2.04			.84 STAGE TODAY

HELENA DISTRICT

SHEET 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at BOX ELDER CREEK NEAR WINNETT, MONT. 3-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1956					STAGE TODAY
12	AUG. 16		1.90			WATER NOT RUNNING
13	SEPT. 10		2.22			
			1.38			
14	13			0		D.C. -.06 HAND LEVELS
15	OCT. 18		.20	0		
	1957					ICE JAM BELOW GAGE;
16	FEB. 28		FROZEN IN			WATER OVER ICE AT GAGE
17a	MAR. 27		1.85			
b			1.52	.2	ESTIMATE	ICE
18	APR. 29		.70	.1	DO	CLEAR
19	MAY 30		1.65		POOL	
20	JULY 1		1.72		TRICKLE	
21	25		1.71			
			.60	0		
						STAGE TODAY SAME AS 7-26-57
22	AUG. 30		.60			BEAVER DAM 25' BELOW GAGE
23	SEPT. 26		—			
24	OCT. 8		—			INST. LEVELS -.03

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at PETROLEUM NO. 2 NEAR WINNETT, MONT. 3-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 14	GAGE	INSTALLED			D.C.+(G.H. X .71)
1	JUNE 21					
2	JULY 21		–			
3	AUG. 24		7.88	385	CULVERT DETERMINATION	
			–	0		
4	SEPT. 26		–	0		
5	OCT. 25		–	0		
6	NOV. 25		–	0		
7	1956 MAR. 26		.25			
			–	0		
			–	0		
8	APR. 23		.30			
			–	0		SNOW MELT RUNOFF PEAK ESTIMATED 2-3 CFS FROM APPEARANCE OF CHANNEL
9	MAY 25		–	0		
10 a	JUNE 22	[illegible]	3.85			
b			1.44			
c			.70			NO FLOW TODAY
11 a	JULY 13	[illegible]	1.39			
b			.38			DO
12 a	AUG. 16		1.40			
b			.87			NO FLOW TODAY
13 a	SEPT. 10		.61			
b			.38			NO FLOW TODAY
14	13		–	0		LEVELS SHOW NO D.C.
15	OCT. 18		–	0		

HELENA DISTRICT

SHEET 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at PETROLEUM NO. 2 NEAR WINNETT, MONT. 3-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1957					
16	FEB. 28		FROZEN IN			ICE & SNOW
17	MAR. 27		DO			CLEAR
18	APR. 29		–	0		
19	MAY 30		–	0		
20	JULY 1		–	0		
21	25		–			RAN LEVELS & RAISED. B.L. –.01 RAISED 0.62' CORR. +606
22	AUG. 30	8-30-57	1.08			
			–.60	6.3	CMM	
23	SEPT. 26	9-15-57	.3			
24	OCT. 8					INST. LEVELS +.60

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at PETROLEUM NO. 3 NEAR WINNETT, MONT. 3-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 MAY 27	GAGE INSTALLED				~~D.C. + 5.08~~
1	JUNE 21					
2	JULY 14		0.42	[illegible]		
3	21		.3			
			—			
4	AUG. 24		3.02	159	CULVERT DETERMINATION	
			—	0		
5	SEPT. 26		—	0		
6	OCT. 25		—	0		
7	NOV. 25		—	0		
8	1956 MAR. 26		—	0		
9	APR. 23		.20	[illegible]		
			—	0		0.2 DRY MUD IN CULVERT NO SIGN OF FLOW
10	MAY 25		—	0		
11 a	JUNE 22	6-18-56	.96	[illegible]		
b			.34	[illegible]		NO FLOW TODAY
12 a	JULY 13	7-5-56	.65	[illegible]		
b			.42	[illegible]		DO
13 a	AUG. 16		.40	[illegible]		
b			.30	[illegible]		DO
14 a	SEPT. 10		.30	[illegible]		
b			.25	[illegible]		DO
15	13		—	0		LEVELS - -.01
16	OCT. 18		—	0		

HELENA DISTRICT

SHEET 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at PETROLEUM NO. 3 NEAR WINNETT, MONT. 3-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1957					
17	FEB. 28		FROZEN IN			ICE & SNOW
18	MAR. 27		—	0		CLEAR
19	APR. 29		—	0		RAISED GAGE 0.29' TO PREVENT SILTING OVER
20	MAY. 30		—	0		
21	JULY 1		—	0		
22	25		—	0		
23	AUG. 30	8-26-57				
			—	4.0		
24	SEPT. 26					
25	OCT. 8		—	0		LEVELS +.295

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at BLACK COULEE NEAR MALTA, MONT. 4-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 27	GAGE INSTALLED				~~D.C. I 14 H~~
1	AUG. 23		—			
2	SEPT. 20		—			
3	1956 JAN 11		—			
4a	MAR. 19		0.88			
b			0.61			
c			.26	5.0	DISCH MMT.	CONTROL CLEAR
5	APR. 9		.36			
6	MAY 3		—	0		
7	8		—	0		
8	JUNE 5		—	0		
9	27		—	0		
10	JULY 10		2.01			NO FLOW TODAY
11	AUG. 10		—	0		DO
12	SEPT. 13		—	0		DO
13	18		—	0		LEVELS - -.03 (HAND)
14	OCT. 16		—	0		
15	DEC. 11		—	0		
16	1957 JAN. 17		—	0		2" PACKED SNOW-DRIFTED
18	MAR. 1		—	0		
19a	28		1.88			
b			1.36			
c			.65			
d			.43			
e			.30			
			— .10	.5	ESTIMATE TRICKLE	

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Black Coulee near Malta, Mont. 4-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
20 a	1957 Apr. 24		.62			
b			.25	3-4	Estimate	
21	May 13		.19			Slight Pool today
22	July 25		.67			do
23	Oct. 1		-			Inst. levels -.025
24	9		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at ALKALI CREEK NEAR MALTA, MONT 4-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 27	GAGE INSTALLED				~~OCT 1 1971~~
1	AUG. 23		—			
2	SEPT. 20		—			
3	1956 JAN. 11		—			
4a	MAR. 19		0.85			
b			.74	38.8	DISCH MMT.	ICE ON BOTTOM
5a	APR. 9	3-19-56	.74			
b				.3	ESTIMATE	
6	MAY 3		-	C		
7	8		—	POOL		
8	JUNE 5		—	POOL		
9	27		—	0		
10	JULY 10		—	POOL		
11	AUG. 10		-	POOL		PROBABLE FLOW DURING PAST WEEK
12	SEPT. 13		-	DO		
13	18		—	-		LEVELS - ±.01
14	OCT. 16		—	POOL		
15	DEC. 11		—	POOL		
16	1957 JAN. 17		—	POOL		2" PACKED, DRIFTED SNOW 2' DRIFT BELOW BRIDGE
17	MAR. 1		—	0		POOL FROZEN
18a	19		.70			
b			.38	10	ESTIMATE	ICE ON SURFACE

Sheet 2

HELENA DISTRICT

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Alkali Creek near Malta, Mont. 4-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
19 a	1957 Mar. 28		1.69			
b			1.37			
c			1.20			
d			.71			
e			.18			Slight trickle today
20 a	Apr. 24		.41			
b			.29			Nothing today
21	May 13		-	0		Pool
22	July 25		-			
23	Oct. 1		-			Inst. levels +.025
24	9		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at DISJARDIN COULEE NEAR MALTA, MONT. 4-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 26	GAGE INSTALLED				~~D.C. + 15.17~~
1	AUG. 23		—			
2	SEPT. 20		—			
3	1956 JAN 11		—			
4a	MAR. 19		0.22	1		
b			.02	1.9	DISCH. MMT	CONTROL CLEAR
5	APR 9	3-19-56	.02	—		
6	MAY 3		—	0		
7	8		—	POOL		MAY HAVE BEEN SLIGHT FLOW IN LAST 4 DAYS
8	JUNE 5		—	0		
9	27		—	0		
10a	JULY 10		1.55	4[illegible]		
b			.70	[illegible]		NO FLOW TODAY
11	AUG. 10		3.22	[illegible]		DO
12	SEPT. 13		—	0		
13	18		—	0		LEVELS - +.01
14	OCT. 16		.32	[illegible]		POOL STAGE TODAY
15	DEC. 11		—	0		COMPLETELY FROZEN
16	1957 JAN. 17		—	0		2" PACKED, DRIFTED SNOW
17	MAR. 1		—	0		DO PACKED DRIFTS IN CHANNEL
18	19		.86	8.9	DISCH. MMT.	SLUSH ICE AND DRIFTED SNOW CAUSING B.W.
19	29		1.02			POOL STAGE TODAY
20	APR. 24		—	0		DO
21	MAY 13		—	0		DO

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Disjardin Coulee near Malta, Mont. 4-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
22	July 25		.59			No flow today
23	Oct. 1		-			Inst. levels -.015
24	9		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at SOUTH FORK TAYLOR CREEK NEAR MALTA, MONT 4-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 28	GAGE INSTALLED				~~D.C. 116.90~~
1	AUG. 23		—			
2	SEPT. 20		—			
3	1956 JAN. 11		—			
4a	MAR 19		1.75			
b			1.18			
c			.81	0.9	DISCH MMT	CONTROL CLEAR
5	APR. 9		81			
6	MAY 3		—	0		
7	8		—	0		NO FLOW FROM RAIN DURING PAST WEEK
8	JUNE 5		—	0		
9	27		—	0		
10	JULY 10		—	0		
11	AUG. 10		—	0		
12	SEPT. 13		—	0		
13	18		—	0		LEVELS - NO CORR.
14	OCT. 16		—	0		
15	DEC. 11		—	0		POOL COMPLETELY FROZEN
16	1957 JAN. 17		—	0		2" PACKED, DRIFTED SNOW
17	MAR. 1		.63			POOLS AT THIS G.H.
18	19		1.26	12.4		APPEARS CLEAR
19a	28		1.43			
b			1.11			
c			.45			NO FLOW TODAY

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at South Fork Taylor Creek near Malta, Mont. 4-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
20	1957 Apr. 24		-	0		Completely dry
21	May 13		-	0		
22	July 25		-	0		
23	Oct. 1		-			Inst. levels -.005
24	9		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at WEST FORK WOLF CREEK NEAR LUSTRE, MONT. 5-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 9	GAGE	INSTALLED			~~DC 1424~~
1	JULY 20		1.12			
			—			
2	AUG 16		—			
3	OCT. 26		—			
4	1956 JAN. 5		—			NO ICE IN STREAMBED
5	MAR. 20		.15			NOT ENOUGH FLOW TO MEASURE. COULD BE CONSIDERED POINT OF ZERO FLOW
6 a	APR. 17		.15			CORK LINE FROM LAST VISIT; NOTHING NOW
7	MAY 31		.25			NOTHING TODAY
8 a	JUNE 26		.89			
b			.51			
			—	POOL		
9	JULY 13		.20			POOL UNDER BRIDGE TODAY
10	SEPT. 14		—	0		NO POOL
11	17		—	0		LEVELS-NO CORR.
12	OCT. 10		—	0		
13	DEC. 14		—	0		
14	1957 FEB 20		—	0		2" LOOSE SNOW WITH 3' DRIFTS IN COULEES
15	MAR 1		.03	0		COMPLETE ICE COVER
16	21		FROZEN IN	< .5		
17 a	29		.46			
b			ABOUT .2	0		RAISED GAGE 0.24
18 a	APR 24		2.0			
b			1.5			FULL STAGE

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at West Fork Wolf Creek near Lustre, Mont. 5-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
19 a	1957 May 21		0.22			
b			.15			Pool stage today
20	July 14		-	0		
21	Sept. 23		-			
22	Oct. 3		-			Inst. levels + .235
23	16		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

5-2

Inspections at EAST FORK WOLF CREEK NEAR LUSTRE, MONT. - LEFT CHANNEL

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 9	GAGE	INSTALLED			~~DC + 5.04~~
1	JULY 20		0.41			
			–			
2	AUG. 16		–			
3	OCT. 26		–			
4	1956 JAN. 5		–			DRIFTS OVER CULVERTS
5	MAR. 20		.91			
			–			4' DRIFTS OVER CULVERTS ON BOTH SIDES OF ROAD
6 a	APR. 17		2.74			STILL SOME SNOW INSIDE CULVERTS
b			2.03			NO FLOW TODAY
7	MAY 31		–	0		
8	JUNE 26		2.90			POOL STAGE NO FLOW TODAY
9	JULY 13		.25			DO
10	SEPT. 14		–	0		
11	17		–	0		UPSTREAM INST. LEVELS-NO CORR.
12	OCT. 10		–	0		
13	DEC. 14		–	0		
14	1957 FEB 20		–	C		
15	MAR 1		.54			SNOW IN CHANNEL STAGE TODAY
16	21			C		
17	29		2.45			NO FLOW TODAY
18	APR 24		.54			NO FLOW TODAY
19	MAY 21		–	0		
20	JULY 14		–	0		

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at East Fork Wolf Creek near Lustre, Mont. -- Left Channel 5-2L

No.	Date of Insp.	Probable Date of Peak	Cork Line Up	Cork Line Dwn	Discharge in cfs	Method of Determining Discharge	Remarks
21	1957 Sept. 23		-				
22	Oct. 3		-				Instal. downst. gage Inst. levels -.02 up +0.93 dwn
23	16		-	-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

5-2

Inspections at EAST FORK WOLF CREEK NEAR LUSTRE, MONT. - RIGHT CHANNEL

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 9	GAGE	INSTALLED			~~D.G. + 15.11~~
1	JULY 20		0.24			
			–			
2	AUG 16		–			
3	OCT. 26		–			
4	1956 JAN. 5		–	0		CULVERT ½ FULL OF SNOW
5	MAR. 20		.48			
			–			CULVERT ALMOST COMPLETELY COVERED BY DRIFTS BOTH ENDS
6	APR. 17		3.26			SOME SNOW IN CULVERTS NO FLOW TODAY
7	MAY 31		–	0		
8	JUNE 26		2.27			POOL STAGE TODAY
9	JULY 13		.20			NO FLOW TODAY
10	SEPT. 14		–	0		
11	17		–	0		UPSTREAM INST. LEVELS - -02 CORR.
12	OCT. 10		–	0		
13	DEC. 14		–	0		
14	1957 FEB 20		–	0		
15	MAR 1		3.3	4.2	DISCH. MMT	ICE IN CHANNEL
16a	21		3.30			
b			2.27	1.0	ESTIMATE	
17	29		2.25			NO FLOW TODAY
18a	APR. 24		1.26			
b			.56			NO FLOW TODAY
19	MAY 21			0		

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at East Fork Wolf Creek near Lustre, Mont. -- Right Channel 5-2R

No.	Date of Insp.	Probable Date of Peak	Cork Line Up	Cork Line Dwn	Discharge in cfs	Method of Determining Discharge	Remarks
20	1957 July 14		-				
21	Sept. 23		-				
22	Oct. 3		-				Installed downs. gage Inst. levels -.025 up +1.48 dwn
23	16		-	-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at ROOSEVELT No. 1 NEAR WOLF POINT, MONT. 5-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cf	Method of Determining Discharge	Remarks
	1955 JUNE 24	GAGE INSTALLED				~~RC. + 6.64~~
1	JULY 20		0.50			
			—			
2	AUG. 15		—			
3	OCT 27		—			
4	1956 JAN. 5		—			6' DRIFT AROUND GAGE. NO ICE IN CREEK BED
5	MAR 20		—			8' DRIFT AROUND GAGE 3' SNOW IN CHANNEL NO FLOW AS YET
6	APR 17		1.61			NO FLOW TODAY
7	MAY 31		—	0		
8	JUNE 26		—	0		
9	JULY 18		—	0		
10	SEPT. 14		—	0		
11	17		—	0		HAND LEVELS — .01
12	OCT. 10		—	0		
13	DEC. 14		—	0		
14	1957 FEB 20		—	0		2" PACKED SNOW ON GROUND, 2'-3' DRIFTS IN COULEES
15a	MAR 1		.38			
			TODAY .2			STREAM BED COMPLETELY FILLED WITH SNOW
16	21		.92			NO FLOW TODAY
17	29		—	0		
18	APR 24		.37			NO FLOW TODAY
19	MAY 21		.38			DO
20	JULY 14		—			
21	SEPT. 23		—			

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Roosevelt No. 1 near Wolf Point, Mont. 5-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
22	1957 Oct. 2		-			Inst. levels -.03
23	16		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at ROOSEVELT NO. 2 NEAR WOLF POINT, MONT. 5-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 24	GAGE INSTALLED				~~DC 1 6.95~~
1	JULY 20		EST. 1.5			ESTIMATED FROM A FEW SCATTERED HIGHWATER MARKS ABOUT 20' BELOW GAGE
			—			
2	AUG. 15		1.20			
			—			
3	OCT. 27		—			
4	1956 JAN. 5		FROZEN IN	0.2	ESTIMATE	ICE AROUND GAGE AT 0.5' ± GAGE 2/3 COVERED BY SNOW DRIFT
5a	MAR. 20			3	ESTIMATE	MAX. FLOW SO FAR
b				1.0	DO	2' ICE AROUND GAGE & THEN 3' SNOW ON TOP
6a	APR. 17		1.92			
b			.98			
c			.53			STAGE TODAY NOT MEASURED
7	MAY 31		.60			
			.20			
			—	TRICKLE		
8	JUNE 26		.32			
			—	TRICKLE		
9	JULY 18		.76			NO FLOW TODAY
			.28			
10	SEPT. 14		—	0		
11	17		—	0		INST. LEVELS: -.014
12	OCT. 10		—	0		
13	DEC. 14		—	0		

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Roosevelt No. 2 near Wolf Point, Mont. 5-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
14	1957 Feb. 20		-	0		2" snow on ground; 2'-3' drifts in coulees
15	Mar. 21		Frozen	About 1		Ice on control; also a large amount of tumble weeds
16 a	29		1.18			
b			.67			
c			below gage	About .1		Control clear
17 a	Apr. 24		.74			
b			.58	1.1	Disch. mmt.	old tumble weeds under bridge
18	May 21		Today .55			Pool stage
19 a	July 14		2.03			
b			.53	<.1		Slight flow
20	Sept. 22		-			Gage removed by highway crew
21	Oct. 2		-			Replaced to datum inst. levels +1.48
22	16		-			

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Wolf Creek near Wolf Point, Mont 5-Supplemental

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
Manual station 1908-14; recording station March 1950 to September 1953, measurements no. 1-54. Dates of inspections obtained from chart for most part. Numbers given here pertain only to Crest-Stage Gage Program.						
1	1955 May 6		3.04			Started recorder. Ice in well.
2	May 11					Float on ice, did notrelease
3	26		2.72			No ice in well
4	June 11		2.39			
5	13		2.37			
6	July 20		2.31			
7	Aug. 25		2.10			
8	Oct. 27		2.34			
						Clock Stopped Jan. 9, 1956
9	1956 Mar. 20					Set float on ice. Ice in channel
10	Apr. 6		3.13			Control clear
11	17		2.96			
12	May 31		2.75			
13	June 26		2.38			
14	Sept. 17		2.28			
						Clock stopped Dec. 3, 1956
15	1957 Jan. 8		2.92			
16	9		2.95			
17	Feb. 20		3.80			Complete ice cover
18	Mar. 29		2.94			
19	Apr. 24		3.76	48.1 ~~4.8~~	CMM No. 55	Control clear
20	July 31		2.20	0.2	CMM No. 56	Reestablished as regular gaging station 7-1-57

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at EAST FORK DUCK CREEK NEAR BROCKWAY, MONT. 6-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 13	GAGE INSTALLED				~~D.C. + 4.35~~
1	JULY 13		1.46	106		
				TRICKLE		UNABLE TO MEASURE BECAUSE OF GRASS
2	AUG. 9		.36	12		
			—	0		GRASS AND WEEDS
3	SEPT. 7		—			
4	OCT. 4		—			
5	DEC. 5		—	0		
6	1956 JAN. 3		—			
7	FEB. 2		—	0		
8	28		—	0		
9a	MAR. 1		.98	50		FROM HWM ON OUTSIDE CSG
b			.52	18.7	DISCH. MMT.	CONTROL CLEAR THAWED OUT GAGE
10	2		1.08	60		.70 AT TIME OF INSP. THAWED OUT.
11	19		.30	10	ESTIMATE	TOO GRASSY TO MEASURE.
12	29		.33	11		
13	APR. 27		—	0		
14	MAY 17		—	0		HAS BEEN SLIGHT TRICKLE, MUD ON BOTTOM
15	JUNE 15	5 A.M. 6-15-56	.50	18		
			—	.5	ESTIMATE	STREAM BED TOO GRASSY TO MEASURE.
16	26		—	0		
17	JULY 17		—	0		
18	AUG. 20		.42	14		NO FLOW TODAY
19	SEPT. 14		—	0		HAND LEVELS +.23 CORR. AFTER ICE

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at East Fork Duck Creek near Brockway, Mont. 6-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
20	1956 Sept. 17		0.04	4		Pool Stage today
21	Oct. 20		-	0		
22	Nov. 28		-	0		
23	Dec. 26		-	0		Creek frozen over at pool stage
24	1957 Feb. 6		-	0		Snow and drifts
25	27		Mean .96	71.0	Disch. mmt.	
26	Mar. 20		Today .29	20	Rough estimate	Some ice on bottom
27 a	27		.68			
b			about-.5	0.1	Estimate	ZF about -0.7' gh
28	Apr. 26		-	0		
29	May 22		-	0		
30 a	July 27		3.45			No flow today
31 b	Sept. 12		-.20			
32	Oct. 6		-			Inst. levels +.19
33	8		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at SOUTH FORK DRY ASH CREEK NEAR CIRCLE, MONT. 6-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 13	GAGE INSTALLED				~~DC + 6.94~~
1	JULY 13	7-12-55	2.18			
			–	TRICKLE		
2	AUG. 9		.30			
			–	0		
3	SEPT. 7		–			
4	OCT 4		–			
5	DEC. 5		–			
6	1956 JAN. 3		.22			
			–			ICE IN CREEK AT 0.1'±
7	FEB. 2			0		STICK FROZEN IN 2" SNOW ON GROUND
8	9		–			THAWED OUT
9	28		.32			
			–	0		THAWED OUT. ICE AROUND GAGE AT .32' DUE TO LOCAL MELTING. NO RUNOFF YET
10a	MAR. 1		1.19			
b			.80	4.0	DISCH. MMT.	SOME ICE ON BOTTOM
11	2		1.37			.78' AT TIME OF INSP.
12a	20		.93			
b			.63			
c			.38	.3	ESTIMATE	ICE
13	29		.42			
14	APR. 27		–	0		
15	MAY 17		.15			NO FLOW TODAY
16	JUNE 15		–	0		POOL UNDER BRIDGE

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at South Fork Dry Ash Creek near Circle, Mont. 6-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
17	1956 June 26		-	0		
18	July 17		-	0		Pool Stage today
19	Aug. 20		-	0		Creek dry
20	Sept. 14		-	0		Transit levels ~~No correction~~ - 01
21	17		-	0		
22	Oct. 12		-	0		
23	Nov. 28		-	0		
24	Dec. 26		-	0		Creek frozen over at pool stage
25	1957 Feb. 6		-	0		Snow and drifts packed on frozen ground
26 b	27		.98	25.5		Ice, snow and debris on control
a			1.58			
27 a	Mar. 20		1.24			
b			1.04			.63 today
28 a	27		1.05			
b			-.12	< 0.1		Zero Flow about -0.2'
29	Apr. 25		-	0		
30	May 22		-	0		
31	July 27		-	0		
32	Sept. 12		-	0		
33	Oct. 6		-			Inst. levels -.025
34	8		-			

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at McCune Creek near Circle, Mont. 6-4

No.	Date of Insp.	Probable Date of Peak	Cork Line Upper	Cork Line Lower	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 June 13	Gage	installed				D.C. upper ~~8.17~~ +3.86 lower ~~4.31~~ oo
1a	July 13	July 12	.38	3.77			
b				.83	1.2	CMM	Partially buried debris
2	21			.88			Nothing at time of insp. Intake covered with mud, cleaned and flushed.
3	Aug. 9			1.33			Nothing at time of insp.
4	Sept. 7			--			
5	Oct. 4			oo			
6	Dec. 5			--			
7	1956 Jan. 3			.26			Ice around lower gage at about 0.2'
8	Feb. 2			--			Intake plugged & frozen
9	9			--			Thawed out
10	28			.02	0		Thawed out. Some ice on creek bottom.
11a	Mar. 1			1.67	15		
11b				1.32	7.5	CMM	Mostly clear but some ice on bottom which might be causing some backwater
12a	2			2.43	40		
12b				2.21	31.5	CMM	Same as No. 11b
13a	20			2.76	52		
b				1.94	22.5	CMM	Thawed out
14a	29			1.92	—		
b				1.58	13		Nothing at time of insp.
15	APR 27			-	0		
16	MAY 17			-	0		CREEK BOTTOM MUDDY
17	JUNE 15		-	-	0		POSTS ARE LOOSE
18	26				0		

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at McCune Creek near Circle, Mont. 6-4

No.	Date of Insp.	Probable Date of Peak	Cork Line Upper	Cork Line Lower	Discharge in cfs	Method of Determining Discharge	Remarks
	1956						
19	July 17			-	0		
20	Aug. 20			-	0		Creek dry
21	Sept. 14			.92		+3.96	+ .55 corr. to lower ~~+ .10~~ corr. to upper Transit levels
22	Sept. 17			.20			Pool stage today
23	Oct. 12			-	0		
24	Nov. 28			-	0		
25	Dec. 26			-	0		Creek dry
	1957						
26	Feb. 6			-	0		Snow and drifts
27	27		.03	3.77	45.0		Ice & debris on control Ice and slush floating
28	Mar. 20			.29	5	Rough Estimate	Control clear
29 a	27			1.87			
b				-.16	0.1	estimate	Zero Flow about -0.4'
30	Apr. 25			.19	0.5 to 1	do	
31	May 22			-	0		
32	July 27		1.03	4.25			Creek dry
33	Sept. 12			1.96			
34	Oct. 6		-	-			Inst. levels +.74 Lower +3.90 Upper
35	8		-	-			

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Tusler Creek near Brockway, Mont. 6-5

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1956 Oct. 12	Gage installed				~~D. C. +3.38~~
1.	Nov. 28		-	0		Pool stage today
2	Dec. 26		-	0		Creek frozen over-pools
3	1957 Feb. 6		-	0		Snow and drifts on frozen ground
4	27		Mean 1.52	181	Disch. mmt.	Ice and snow drifts in stream bed
5 a	Mar. 20		1.66			
b			Below gage	2-3	Estimate	Ice cover on control
6	27		-.60	< 0.1		Zero Flow about -0.8'
7	Apr. 25		-	0		
8	May 22		-	0		Pool stage today
9	July 27		-	0		
10	Sept. 12		-	0		
11	Oct. 6		-			Inst. levels +.04
12	8		-			

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at McCone No. 1 near Brockway, Mont. 6-6

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1956 Sept. 15	Gage installed				~~D. C. = 9.43~~
1	Oct. 19		-	0		Pool stage today
2	Nov. 28		-	0		do
3	Dec. 26		-	0		Creek frozen over at pool stage
4	1957 Feb. 6		-	0		Snow and drifts on frozen ground
5	27		.31	13.9	Disch. mmt.	Snow bank, grass, willows and debris on control
6	Mar. 20		Below gage	.2	Estimate	No ice in creek
7	27		-	0		Pool stage today
8	Apr. 25		-	0		do
9	May 22		-	0		
10 a	July 27		.81			
b			.51			No flow today
11	Sept. 12		.44			do
12	Oct. 6		-			Inst. levels -.005
13	8		-.18			No flow today

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HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Duck Creek near Brockway, Mont. 6-7

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1957 May 21	Gage installed				~~D. C. + 1.804~~
1 a	May 31		2.39			
b			.40			
c			.35			Pool stage today
2 a	July 27	7-14-57	4.00	600	Slope-conveyance Oct. 6	
b			2.01			
c			.99			No flow today
3	Sept. 12		3.30			do
4	Oct. 6		-			Slope-conveyance run inst. levels -.004
5	8		-			

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Big Muddy Creek at Plentywood, Mont. 7-Supplemental

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
Recording station operated March 1948 to September 1953, measurement nos. 1-77. Numbers shown here pertain only to CSG program.						
	1955 June 10	Gage installed				D. C. +4.81 ft
1	July 20		-			
2	Aug. 18		-			
3	Sept. 16		-			
4	Oct. 19		-			
5	Dec. 2		-			Complete ice cover
6	1956 Jan. 4		-			do
7	Feb. 8		-	0		do
8	29		-			do Just starting to run water over ice
9	Mar. 22	Today	1.82			Just starting to run; slush jammed near gage
10	June 13		-			
11	25		-			
12	July 13		-			
13	Aug. 30		-			
14	Sept. 16		-			Hand levels -.02 Do not use. Use +4.81
15	Dec. 12		-			Creek frozen over
16	1957 Jan 14		-			Complete ice cover
17	Feb. 19		-			
18	Mar. 28	HWM outside	1.3			Some BW due to light ice cover
19	Apr. 25		-			
20	May 22		-			
21 a	July 25		1.77			
b			.40			

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Big Muddy Creek at Plentywood, Mont. 7-Supplemental

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
22	1957 Sept. 26		-			
23	Oct. 4		-			Inst. levels +4.80

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at BOX ELDER CREEK NEAR PLENTYWOOD, MONT. 7-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 10	GAGE INSTALLED				~~D.C. = 16.67~~
1	JULY 20		–	0		
2	AUG 18		–	0		
3	SEPT. 16		–	0		
4	OCT. 19		–	0		
5	DEC. 2		–	0		
6	1956 JAN. 4		–	0		
7	FEB. 8		–	0		2' SNOW OVER INTAKE. SNOW OVER BOTH ENDS CULVERT FIELDS BARE
8	29		–	0		
9	MAR. 22		0.25	0		SLIGHT TRICKLE HAS FORMED POOL AND FROZEN IN PIPE. CLEANED OUT CULVERT
10	APR. 26		–			
11	JUNE 13		–	0		
12	25		–	0		
13	JULY 13		–	0		
14	AUG. 30		–	0		GAGE TORN OUT
15	SEPT. 16		–	0		REPLACED TO DATUM ~~D.C. = 16.96~~ –.71
16	OCT. 27		–	0		
17	DEC. 12		–	0		
18	1957 JAN. 14		–	0		
19	FEB 19		.2			POOL FROZEN
20a	MAR 11		1.58			
b			1.31	3.3		ICE, ANCHOR ICE AND GRASS IN STREAM

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Box Elder Creek near Plentywood, Mont. 7-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
21 a	1957 Mar. 28		1.29			
b			1.06			
c			.63			Today 0.42 -- pool stage
22	Apr. 25		.42			from Mar. 28
23	May 22		-			
24 a	July 25	July 23	7.24	[illegible]	Cul. det. & flow-over-road made July 31	
b			3.39			.79 today; BW from trash in culvert
25	Sept. 26		.97			No flow today
26	Oct. 4		-			Inst. levels -.71

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at BOX ELDER CREEK AT DAMSITE, NEAR PLENTYWOOD, MONT. 7-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
1		JUNE 30, 1953	2059.2	6,530	CONTRACT - OPEN	
2		AUG. 1, 1953	2056.02	1,400	SLOPE - AREA	
3		MAR. 29, 1955	2055.10	890	DO	
4	APR. 19, 1955		—	.4	ESTIMATE	
	1955 JUNE 23	GAGE INSTALLED				+ 52.68 to MSL ~~DC + 12.84~~
5	JULY 20		—	0		
6	AUG 18		—	0		
7	SEPT. 16		—	0		
8	OCT 19		—	0		
9	DEC. 2		—	0		
10	1956 JAN. 4		—	0		
11	FEB. 8			0		COULD NOT GET TO GAGE BECAUSE OF HEAVY DRIFTS.
12	29		—	0		
13	MAR. 22		—			SLIGHT TRICKLE IN CREEK. GAGE HIGH AND DRY.
14	APR. 26		—			
15	JUNE 13		—	0		
16	25		—	0		
17	JULY 13		—	TRICKLE		
18	AUG. 30		—	0		
19	SEPT. 16		—	0		HAND LEVELS +.01 CORR.
20	OCT. 27		—	0		
21	DEC. 12		—	0		STICK MISSING
22	1957 FEB. 19		—	0		

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Box Elder Creek at damsite, near Plentywood, Mont. 7-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
23 a	1957 Mar. 11		.13			
b		Today	.1			
24	28		-.25	0.5	Estimate	
25	Apr. 25		-			
26	May 22		-			Slight flow
27 a	July 25	July 23	3.50			
b			2.01			
c			1.20			0.59 at time of insp. very slight flow
28	Sept. 26		-			
29	Oct. 4		-			Inst. levels +.055

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at SPRING CREEK NEAR PLENTYWOOD, MONT. 7-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 23	GAGE INSTALLED				~~DC + 28.43~~
1	JULY 20		0.69			
			—	0		
2	AUG. 18		—	0		
3	SEPT. 16		—	0		
4	OCT. 19		—	0		
5	DEC. 2		—	0		
6	1956 JAN. 4		—	0		2' SNOW IN CHANNEL CULVERT HALF BURIED-UPPER END
7	FEB. 8		—	0		3' SNOW OVER INTAKE. UPPER END CULVERT BURIED, LOWER 1/2. PLOWED FIELDS BARE, OTHER 1½"-2" SNOW
8	29		—	0		
9	MAR. 22		.25			
			—	0		THERE HAS BEEN NO FLOW. CULVERT 1/2 FULL OF SNOW. THAWED OUT PIPE
10	APR. 26		—			
11	JUNE 13		—	0		
12	25		—	0		
13	JULY 13		—	0		
14	AUG. 30		—	0		
15	SEPT. 16		—	0		INST. LEVELS -.015
16	OCT. 27		—	0		
17	DEC. 12		—			COMPLETE ICE COVER
18	1957 JAN. 14		—	0		
19	FEB. 19		—	0		
20a	MAR. 11		1.06			
b			.84			POOL STAGE TODAY

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Spring Creek near Plentywood, Mont. 7-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
21	1957 Mar. 28		-			
22	Apr. 25		-			
23	May 22		-			
24 a	July 23	July 23	2.77	16	Culvert Deter. made July 31	
b			1.65			
c	July 24		.44	Pool		
25	Sept. 26		.49			No flow today
26	Oct. 4		-			Inst. levels -.015

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at SPRING CREEK AT HIGHWAY 16, NEAR PLENTYWOOD, MONT. 7-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 23	GAGE INSTALLED				~~D.G. + 14.76~~
1	JULY 20		0.28			
			—	0		
2	AUG 18		—	0		
3	SEPT. 16		—	0		
4	OCT. 19		—	0		
5	DEC. 2		—	0		ICE AT 0.2' G.H. ON OUTSIDE OF PIPE. STICK FROZEN IN TUBE
6	1956 JAN. 4		—	0		
7	FEB. 8		—	0		FROZEN IN
8	29		—	0		DO
9	MAR. 22		.33	POOL		THAWED OUT GAGE. THIN LAYER OF ICE ON POOL
10	APR. 26		.55			
11	JUNE 13		—	0		POOL STAGE AT BRIDGE
12	25		—	0		
13	JULY 13		Est. .30			CORK LINE INDEFINITE POOL STAGE
14	AUG. 30		—	0		
15	SEPT. 16		—	0		INST. LEVELS +.13 CORR.
16	OCT. 27		—	0		ICE ON GAGE POOL
17	DEC. 12		—	0		FROZEN OVER
18	1957 JAN. 15		—	0		DO
19	FEB. 19		—	0		
20	MAR. 28		ABOUT 0.4			ZF about 0.4' RAISED GAGE 0.43'
21	APR. 25		.08			POOL STAGE TODAY
22	MAY 22		—			

Sheet 2

HELENA DISTRICT

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Spring Creek at Highway 16, near Plentywood, Mont. 7-4

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
23 a	1957 July 23	July 23	2.72	541	Slope-conveyance made 7-31-57	
b			.97			
24	Sept. 26		-			
25	Oct. 4		-			Inst. levels +.66

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at WETS CREEK NEAR BILLINGS, MONT. 8-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 MAY 26	GAGE INSTALLED				~~D.C. + 4.73~~
1	JULY 1		0.87	3	ESTIMATE	
2	AUG. 16		.92			
			.86			SMALL FLOW IN CREEK
3	SEPT 14		.97			
			.79	2	ESTIMATE	
4	OCT. 20		.08			
			—			STAGE BELOW GAGE
5	NOV. 14		—			DO COMPLETE ICE COVER
6a	1956 MAR. 20		3.23			
b			2.15			
c			1.73			
d			1.42			
e			.25	.5	ESTIMATE	ZERO FLOW AT 0.1
7a	MAY 23		.35			
b			.15	0.8	ESTIMATE	FLOW DUE TO IRRIGATION WASTE WATER
8a	JULY 6		1.55			
b			.67			
c			.83	0.6	MEASUREMENT	
9	SEPT. 11		.14	.5	ESTIMATE	
10	13		—	0		HAND LEVELS -.04 CORR.
11	DEC 20		.03	0.1	ESTIMATE	SHORE ICE
12a	1957 APR. 17		.55			
b			.05	.2	ESTIMATE	CONTROL CLEAR

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Wets Creek near Billings, Mont. 8-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
13 a	1957 Apr. 24		1.4			
b			0.1	1.2	Disch. mmt.	
14 a	May 14		.70			
b			.07	.5	Disch. mmt.	
15 a	May 21		1.25			
b			1.07			
c			mean1.16	38.7		
16 a	June 10		1.66			
b			1.15			Today 0.20, after removing brush, 0.29
17 a	June 17		.91			
b			.50			
c			.49	12.3	Disch. mmt.	
18 a	July 11		1.00			
b			.40			
c			.21	3	Estimate	
19	Oct. 8		.20			GH on July 11 Inst. levels -.005

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at YELLOWSTONE No. 1 NEAR BILLINGS, MONT. 8-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 MAY 26	GAGE INSTALLED				~~D.G. +8.00~~
1	JULY 1		1.12	3	ESTIMATE	
2	AUG. 16		1.48			
			1.36			WATER RUNNING
3	SEPT. 14		1.54			
			.80			
			1.29	3	ESTIMATE	
4a	OCT. 20		.97			
b			.63			
5	NOV 14					FROZEN IN COMPLETE ICE COVER
6a	1956 MAR. 20		1.2			
b			.65	.3	ESTIMATE	UPS HWM 10'± DS HWM 9.5'± SNOW FENCE ACROSS CHANNEL BELOW BRIDGE WITH DEBRIS AND GRAVEL LODGED AGAINST
7	MAY 23		1.60			STAGE TODAY. FLOW IS DUE TO IRRIGATION WASTE. SNOW FENCE FORMING POOL.
8 a	JULY 6		2.18			
b			1.28			
c			1.26	1.0	MEASUREMENT	
9 a	SEPT. 11		1.60			
b			1.23			
c			.64	1.5	ESTIMATE	
10	13		–	0		HAND LEVELS +.06 CORR.
11	DEC. 20			0		STICK FROZEN IN
12a	1957 APR. 17		.85			
b			.55			

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Yellowstone No. 1 near Billings, Mont. 8-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
13 a	1957 Apr. 24		1.7			
b			.20	2.0	Disch. mmt.	
14 a	May 14		1.70			
b			.37	5.5	Disch. mmt.	
15 a	May 21		1.30			
b		Mean	1.18	77.7	Disch. mmt.	
16 a	June 10		1.12			Gage height after measuring on May 21
b			.57			Today 0.42' gh
17 a	June 17		.69			80% of flow from irr. ditch return
b			.40	7.0	Disch. mmt.	Brush etc against pole at 4' not recorded
18 a	July 11		1.02			
b			.78			
c			.52	5	Estimate	Total flow due to irrigation return
19	Oct. 8		-			Inst. levels +.11

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at PRYOR CREEK NEAR BILLINGS, MONT. 8-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
MANUAL STATION MARCH 1938 TO DECEMBER 1953 MEASUREMENTS NOS. 1-168 CSG TIED TO DATUM						
	1955 MAY 26	GAGE INSTALLED				D.C. +2.61
1	JULY 1		0.82	286		
						RUNNING TODAY ABOUT 1' BELOW GAGE
2	AUG. 16		.37	221		
			.21	199		WATER RUNNING
3	SEPT. 14		.17	192		
				10	ESTIMATE	
4	OCT. 20		—			BELOW GAGE
5	NOV. 14		—			DO PARTIAL ICE COVER
6	1956 MAR. 20		[illegible]	about 800		ICE JAM AT BRIDGE AND ONE BELOW AT BEND OF CREEK. PROBABLY 2-3' BACKWATER
7	MAY 23		2.54	612		
			1.46	[illegible]		
			1.27	307		
8	SEPT. 11		—			1.23 BELOW PIPE
9	13		—			TRANSIT LEVELS +2.63 CORR.
10	DEC. 20		—			PARTIAL ICE COVER
11	1957 APR. 17		.75			BELOW GAGE TODAY
12 a	24		3.00			
b			1.95	500	DISCH. MMT.	
13	MAY 14		2.82			.45 GH TODAY
14	21		today 2.35			
15						

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Pryor Creek near Billings, Mont. 8-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
15 a	1957 June 10		3.52			
b			2.57			below gage today
16	June 17	6-17-57	1.04			
17 a	July 11		1.74			
b			.97			
18	Oct. 8		1.22			Inst. levels + 2.61

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Rosebud Creek near Forsyth, Mont. 9_1-Supplemental

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
Recording station operated May 1947 to December 1953, measurement nos. 1-73. Numbers shown here pertain only to Crest-Stage Gage Program. Dates of inspections obtained from chart.						
1	1955 July 15		3.45			Started recorder
2	Aug. 5		3.43			
3	Sept. 8		2.35			
						Clock stopped Nov. 14, 1955
4	1956 Mar. 25		6.28			
5	Apr. 12		4.45			
6	May 17		3.72			
7	June 21		4.01			
8	July 30		4.21			
9	Aug. 29		4.80			
10	Oct. 15		2.93			Stopped for winter
11	1957 Mar. 21		4.95			
12	May 17		5.08			
13	June 14		4.55			Small beaver dams in various places

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at CUSTER NO. 1 NEAR VOLBERG, MONT. 9-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 23	GAGE INSTALLED				~~D.C. #1178~~
1	1956 APR. 18		.24			
			—			SNOW RUN OFF NO RAIN YET
2	JUNE 7		—	0		
3	JULY 24		—	0		
4	AUG. 7		—	0		
5	SEPT. 6		—	0		
6	12		—	0		HAND LEVELS- +.01
7	OCT. 3		—	0		
8	NOV. 9		—	0		
9	1957 MAY 9		—	0		
10	OCT. 7		—	0		INST. LEVELS +.085
11	25		—	0		

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at BASIN CREEK NEAR VOLBORG, MONT. 9-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 23	GAGE INSTALLED				~~D.G. + 18.61~~
1	1956 APR. 18		1.1	[illegible]		
			.6	[illegible]		
			–			SNOW RUN OFF NO RAIN YET
2	JUNE 7	[illegible]	.65	3	ESTIMATE	NO FLOW TODAY
3 a	JULY 24		2.46	[illegible]		DO
b			1.97	[illegible]		
4 a	AUG. 7		1.16	[illegible]		
b			.80	[illegible]		NO FLOW TODAY
5 a	SEPT. 6		5.76	[illegible]	SLOPE-AREA	
b			1.10	[illegible]		NO FLOW TODAY
6	[illegible] 11		–	0		RAN SLOPE-AREA INST. LEVELS +.01
7	OCT. 3		–	0		
8	NOV. 9		–	0		
9	1957 MAY 9		3.45			NO FLOW TODAY
10	17		–	0		
11 a	JUNE 23		1.40			
b			.92			
c			TODAY –.05	TRICKLE		GRASS CHOKES CHANNEL
12 a	AUG. 13		2.36			
b			.65			NO FLOW TODAY
13	SEPT. 11		.10			DO
14	OCT. 7		–			INST. LEVELS +.005
15	25		–			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at SAND CREEK NEAR BROADUS, MONT 9-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JULY 22	GAGE	INSTALLED			~~DC # 1743~~
1	AUG 24		—			
2	OCT. 4		—			
3	27		—			
4	DEC. 1		—			
5	1956 JAN 20					SNOW IN CHANNEL
6	FEB. 20					DO
7a	MAR 26		1.75			
b			1.2			
			—			
8	APR. 26		—			NO EVIDENCE OF RUNOFF
9	JUNE 7		—	0		
10	JULY 26		—	0		
11	AUG. 8		—	0		
12	SEPT. 6		1.08			NO FLOW TODAY
13	12		—	0		HAND LEVELS +.03 CORR.
14	OCT. 16		—	0		
15	NOV. 15		—	0		
16	DEC. 18		—	0		
17	1957 MAR. 12		1.1			LITTLE IF ANY FLOW AT 1.1' NO FLOW TODAY
18	APR. 26		.75			
19	MAY 16		—	0		
20a	JUNE 22		1.07			
b			TODAY .88	TRICKLE		2F = 0.7'GH

Sheet 2

HELENA DISTRICT

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Sand Creek near Broadus, Mont. 9-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
21	1957 July 18		-			
22	Aug. 15		.80			Dry today
23 a	Sept. 12		1.55			
b			1.15			
24	Oct. 7		-			Inst. levels +.01
25	25		-			

HELENA DISTRICT

Sheet 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Little Powder River near Broadus, Mont. 92-Supplemental

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
Recording station operated May 1947 to September 1953, measurement nos. 1-72. Numbers shown here pertain only to CSG program. Dates of inspections obtained from chart.						
1	1955 July 26		Gage Height 0.25			Started recorder
2	Aug. 24		.05			
3	Oct. 27		water below intakes			
4	Dec. 2		.50			Stopped for winter
5	1956 Apr. 26		.42			
6	June 7		.19			
7	Aug. 8		.06			
8	Sept. 6		float on mud			
9	Oct. 16		do			Stopped for winter
10	1957 Mar. 12		.96			
11	Apr. 26		1.73			
12	May 17		.11			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at WOLF CREEK NEAR HAMMOND, MONT. 9-5

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
1	1955 JULY 11			298	FLOW THRU PIPE	NOT SUBMITTED FOR APPROVAL
	22	GAGE INSTALLED				~~DC + 4398~~
2	DEC. 2		2.34	115		NO FLOW TODAY
3a	1956 APR. 26		3.4	210		
b			3.3	202		
c			— .05	15 POOL		ESTIMATED MAXIMUM DISCHARGE 25-30 CFS
4a	JUNE 7	5-15-56	1.6	74		
b		5-25-56	.45	27		POOL STAGE TODAY BELOW GAGE
5a	AUG. 8		2.9	165		
			1.9	90		
			1.25	58		POOLS TODAY
6	SEPT. 6		—	0		
7	12		—	0		HAND LEVEL +.05 CORR
8	OCT. 16		—	0		
9	NOV. 14		—	0		
10	DEC. 19		—	0		
11a	1957 MAR. 12		1.2			
b			.80	1.3	DISCH. MMT.	Z.F. 0.40'
12a	APR. 26		.87			
b			.30			.02 TODAY
13	MAY 17		—	0		
14a	JUNE 22		3.02			
b			2.73	64.5	DISCH. MMT.	

Sheet 2

HELENA DISTRICT

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Wolf Creek near Hammond, Mont. 9-5

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
15	1957 July 18		2.70			Below gage today
16	Aug. 14		.70			No apparent sign of run off
17 a	Sept. 12		4.50			
b			1.00			
18	Oct. 7		-			Inst. levels +.08
19 a	Oct. 25		.87			
b			.48			0.33 at ice today Zero flow 0.35

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at WIBAUX NO. 1 NEAR WIBAUX, MONT. 10-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 30	GAGE INSTALLED				~~D.C. + 705~~
1	JULY 14		—	0		
2	AUG 8		—	0		
3	SEPT. 8		—	0		
4	OCT 5		—	0		
5	NOV. 19		—	0		
6	1956 JAN. 3		—	0		
7	FEB 9		—	0		
8	28		—	0		
9	MAR 1		0.12			
			.05	TRICKLE		
10	20		.23			
			.20	0		
11	APR. 27		—			
12	MAY 17		.10			NO FLOW TODAY
13	JUNE 14		—	0		
14	18		—	0		
15	25		—	0		
16	JULY 18		—	0		
17	AUG. 21		—	0		
18	SEPT. 15		—	0		HAND LEVELS -.05 CORR.
19	OCT. 15		—	0		
20	NOV. 15		—	0		
21	DEC. 27		—	0		

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Wibaux No. 1 near Wibaux, Mont. 10-1

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
22	1957 Feb. 6		-	0		3" snow and 3' drifts on frozen ground
23	27		.43	.9	Disch. mmt.	Ice
24 a	Mar. 20		1.61			
b			Mean .78	3.6	Disch. mmt.	Control clear
25	28		.76			gh is same as at close of mmt. on Mar. 20
26	Apr. 26		-	0		
27	May 31		-	0		
28	Aug. 8		1.41			Rain No flow today
29	Sept. 24		.61			No flow today
30	Oct. 5		-			Inst. levels +.005
31	29		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at GRIFFITH CREEK NEAR GLENDIVE, MONT. 10-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 30	GAGE INSTALLED				~~D.C. + 8.00~~
1	JULY 21		—	0		
2	AUG. 8		—	0		
3	SEPT. 8		—	0		
4	OCT. 5		—	0		
5	NOV. 19		—	0		
6	1956 JAN. 3		—	0		
7	FEB. 9		—	0		
8	28		—	0		
9	MAR. 1		.16	.5	ESTIMATE	
10a	2		.35			
b			.20	> 1	ESTIMATE	
11a	20		.86			
b			.52			
c			.30			
d			— .41	1-1.5	ESTIMATE	
12	APR. 27		—			
13	MAY 17		—	TRICKLE		
14	JUNE 14		—	0		
15	18		—	0		
16	25		—	0		
17	JULY 18		—	0		POOL STAGE
18	AUG. 21		—	0		TRICKLE
19	SEPT. 15		—	0		HAND LEVELS +.02

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Griffith Creek near Glendive, Mont. 10-2

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
20	1956 Sept. 18		-	0		
21	Oct. 15		-	0		
22	Nov. 15		-	0		
23	Dec. 27		-	0		
24	1957 Feb. 6		-	0		3" snow on ground; 3' drifts in coulees
25 a	27		-.79	15.0	Disch. mmt.	Slush ice floating
26	Mar. 20	Mean	.24	43.0	do	Control clear
27 a	28		.27			gh at time of close of mmt. on Mar. 20
b			-.63	.1	Estimate	Lowered pipe 0.03 S.F. -0.7'
28	Apr. 26		-	0		
29	May 30		-	0		
30	Aug. 8		-	0		Rain today
31	Sept. 24		-			
32	Oct. 5		-			Inst. levels -.005
33	29		-			

HELENA DISTRICT

SHEET 1

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at SPRING CREEK NEAR WIBAUX, MONT. 10-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
	1955 JUNE 29	GAGE INSTALLED				~~D.C. +7.64~~
1	JULY 13		—	0		
2	AUG 8		—	0		
3	SEPT. 8		—			
4	OCT. 5		—			
5	NOV. 19		—			
6	1956 JAN. 3		—			
7	FEB. 9		—			
8	28		—	0		
9	MAR. 1		—	POOL		
10a	20		.67			
b			BELOW GAGE	.5	ESTIMATE	
11	APR. 27		—			
12	MAY 17		—	POOL		
13	JUNE 14		—	POOL		
14	18		—	0		
15	26		—	0		
16	JULY 18		—	0		
17	AUG. 21		—	POOL		
18	SEPT. 15		—	0		HAND LEVELS +.12 CORR.
19	18		—	POOL		
20	OCT. 15		—	POOL		
21	NOV. 15		—			POOL FROZEN OVER
22	DEC. 27		—			DO

HELENA DISTRICT

Sheet 2

CREST-STAGE GAGE PROGRAM

In Cooperation with Montana State Highway Department

Inspections at Spring Creek near Wibaux, Mont. 10-3

No.	Date of Insp.	Probable Date of Peak	Cork Line	Discharge in cfs	Method of Determining Discharge	Remarks
23	1957 Feb. 6		-	0		Snow and drifts
24	27		0.48	.1		Ice and trash on fence
25 a	Mar. 21		1.01			
b			-.8	1	Estimate	Some light shore ice
26	28		-	0		Lowered gage 0.45' ZF -0.6' after lowering
27	Apr. 26		-	0		
28	May 31		-	0		
29	Aug. 8		-	0		Rain today
30	Sept. 24		1.88			No flow today
31	Oct. 5		-			Inst. levels -0.52
32	29		-			